We Claim:

1. A method of using a bottom hole assembly deployed in a borehole to estimate a formation property comprising the steps of:

(a) generating a source signal from said bottom hole assembly;

(b) detecting at least one receiver signal using said bottom hole assembly;

(c) computing a frequency dependent characteristic of said at least one receiver signal; and

(d) using said frequency dependent characteristic to estimate said formation property.

2. The method of claim 2 wherein said tool is a bottom hole assembly of a drilling apparatus.

3. The method of claim 2 wherein said source signal is a noise spectrum generated by a drill bit of said drilling apparatus.

4. The method of claim 3 wherein said step of determining frequency dependence is carried out by cross-correlation analysis.

5. The method of claim 4 wherein said at least one receiver signal comprises a direct formation signal, and wherein said formation surrounds said borehole.

EXPRESS MAIL NO. ET558242993US
Dated October 9, 2001

6. The method of claim 4 wherein said at least one receiver signal comprises a reflected signal, and wherein said formation is ahead of said borehole.

7. The method of claim 1 wherein said frequency dependent characteristic is amplitude attenuation.

8. The method of claim 7 wherein the formation property is pore pressure.

9. The method of claim 8 wherein said pore pressure is estimated from a frequency dependent attenuation relationship.

10. The method of claim 1 wherein said frequency dependent characteristic is wave propagation velocity.

11. The method of claim 10 wherein said formation property is pore pressure.

12. The method of claim 1 wherein said formation property is lithology.

13. The method of claim 1 wherein said formation property is fluid content.

14. The method of claim 1 wherein said formation property is rock strength.

15. The method of claim 1 wherein said tool is a bottom hole assembly of a measurement while well logging system.

16. The method of claim 1 wherein said source signal is generated by an active source located on said bottom hole assembly.

17. The method of claim 16 wherein said step of determining frequency dependence is carried out by a frequency component analysis.

18. The method of claim 1, wherein said at least one receiver signal comprises a direct borehole signal.

19. The method of claim 18 wherein said formation property is permeability.

20. A method of continuously estimating the pore pressures of formations ahead of a bottom hole assembly, comprising the steps of

a) generating a source signal from said bottom hole assembly;

b) detecting at least one receiver signal using said bottom hole assembly;

c) using said source signal and said receiver signal to estimate a pore pressure of at least one said formation; and

d) repeating steps a), b), and c) as said bottom hole assembly moves sequentially downward through said formations.

Sub B1

21. A method of continuously monitoring the wellbore pressure safety margin corresponding to formations ahead of a bottom hole assembly, comprising the steps of

a) generating a source signal from said bottom hole assembly;

b) detecting at least one receiver signal using said bottom hole assembly;

c) using said source signal and said receiver signal to determine a pore pressure of said formation;

d) using said pore pressure to monitor said wellbore pressure safety margin; and

e) repeating steps a), b), c) and d) as said bottom hole assembly moves sequentially downward through said formations.

22. A method of continuously optimizing the weight of drilling mud used in a drilling operation, comprising the steps of

a) generating a source signal from a bottom hole assembly;

b) detecting at least one receiver signal using said bottom hole assembly;

c) using said source signal and said receiver signal to determine a pore pressure of a formation ahead of said bottom hole assembly; and

Sub B'

d) using said pore pressure to specify a weight of said drilling mud which corresponds to a target wellbore pressure safety margin.

EXPRESS MAIL NO. ET558242993US
Dated October 9, 2001